3-3-08 1fw

Docket No.: 24.0808 PATENT

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**
**BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Application of :
:
Inventor(s): Fredette, et al. :
:
U.S. Patent Application No. 10/708,926 : Group Art Unit: 2862
:
Filed: April 1, 2004 : Examiner: DAVID SCHINDLER

For: A Combined Propagation and Lateral Resistivity Downhole Tool

## TRANSMITTAL OF APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Submitted herewith is Appellant Appeal Brief in support of the Notice of Appeal filed October 24, 2007, the time for responding due December 24, 2007. The Appeal Brief fee of $510.00 is submitted herewith.

A Petition for a Three Month Extension of Time for $1,050.00 is attached hereto. The Commissioner is hereby authorized to charge these fees and charge any additional fees or credit any overpayments related to this Appeal Brief to Deposit Account No. **190610 (24.0808US)**, maintained by Schlumberger Technology Corporation.

Date: 2-29-2008

Respectfully submitted,

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| U.S. Patent Application No. 10/708,926 | : | Group Art Unit: 2862 |
| Filed: April 1, 2004 | : | Examiner: DAVID SCHINDLER |

For: A COMBINED PROPAGATION AND
LATERAL RESISTIVITY DOWNHOLE TOOL

**BRIEF ON APPEAL**

Mail Stop BOPA
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Further to the Notice of Appeal filed October 24, 2007, in connection with the above-identified application on appeal, Appellant submits this Brief on Appeal.

## TABLE OF CONTENTS

## I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Schlumberger Technology Corporation, a company organized under the laws of the State of Texas and having a business address of 200 Gillingham Lane, MD 9, Sugar Land, Texas 77478.

## II. RELATED APPEALS AND INTERFERENCES

There are no related appeals and/or interferences that will directly affect, or be directly affected by, or have a bearing on the Board's decision in this appeal.

## III. STATUS OF CLAIMS

### A. Total Number of Claims in Application

There are a total of 19 claims pending in the instant application, namely Claims 10-22, 35-37, and 39-41.

### B. Status of all the claims

1. Claims cancelled: 1-9, 23-34, 38
2. Claims pending: 10-22, 35-37, and 39-41
3. Claims allowed: none
4. Claims rejected: 10-22, 35-37, and 39-41

### C. Claims on Appeal

Claims on appeal are Claims 10-22, 35-37, and 39-41 as rejected by the Final Office Action mailed July 25, 2007.

## IV. STATUS OF AMENDMENTS

A Response to Final Office Action was filed on September 25, 2007. No amendment has been filed subsequent to the Final Rejection of July 25, 2007.

## V. SUMMARY OF CLAIMED SUBJECT MATTER

An embodiment of the subject invention is exemplified in independent Claims 10 and 35. This embodiment is included in each of Claims 10-22, 35-37, and 39-41 (Group I).

Independent Claim 10, upon which Claims 11-22 depend, is directed to a resistivity logging tool. Embodiments according to this claimed invention are illustrated collectively in FIGS. 5-7A, and 11 and discussed in paragraphs 0019 through 0080 in Applicants' Specification. In this Brief, references are made to paragraphs of the Specification as published on October 6, 2005. More specifically, the resistivity logging tool of Claim 10 includes a propagation or induction resistivity antenna 105 that is disposed on an elongated tubular 57 having a longitudinal axis and adapted for subsurface disposal. See *e.g.*, ¶ 0063 and FIG. 11. The resistivity logging tool also includes a lateral resistivity sensor 50, 104 that is disposed in a recess 53 in the elongated tubular 57 and a shield 58, 108 disposed on and about the tubular 57 to cover the recess 53 and the lateral resistivity sensor 50. See *e.g.*, ¶¶ 0046, 0049, and 0062, and FIGS. 5 and 11. The resistivity logging tool according to the invention further includes an insulating mechanism 75 including a circumferential gap 75. *Id.* The circumferential gap 75 extends continuously about the tubular 57 to prevent electric current flow in the shield in a direction parallel to the longitudinal axis of the tubular 57 near the lateral resitivity sensor 50, 104. *Id*; see also FIGS. 7A and 8.

Independent Claim 35, upon which Claims 36-37 and 39-41 depend, is directed to a method for building a resistivity tool using an elongated tubular having a longitudinal axis and adapted for disposal within a subsurface formation. FIG. 14 illustrates one method according to an embodiment of the invention. The method according to the invention includes disposing a lateral resistivity sensor in the tubular (31) and disposing an induction or propagation resistivity on the tubular (132). See *e.g.*, Fig. 14. The method also requires positioning a shield assembly

on and about the tubular to cover the recess and the lateral resistivity sensor (133). See *e.g.*, FIG. 14 and ¶¶ 0023, 0074-0077. The method further requires extending a circumferential gap continuously about the tubular and electrically between the shield assembly and the tubular, thereby preventing electric current from flowing along the shield in a direction parallel to the longitudinal axis of the tubular near the lateral resistivity sensor. See *Id.*

A further embodiment of the subject invention is also exemplified by Claim 11 (Group 2, below), which relates to a further and more specific definition of the lateral resistivity sensor. Claim 11 depends from independent Claim 10, and further recites that the lateral resistivity sensor comprises a toroid. See *e.g.*, ¶ 0046 and FIGS. 5 and 11. An embodiment of the subject invention is also exemplified by Claim 21 (Group 3, below). Claim 21 depends from Claim 10, and recites further that the recess contains both the induction or propagation resistivity antenna and the lateral resistivity sensor. Claim 36 depends from independent method Claim 35, and exemplifies yet another embodiment of the invention (Group 4, below). Claim 36 further recites that the step of disposing the lateral resistivity sensor includes disposing a base layer of an insulating material in the recess in the tubular, and assembling a toroidal antenna comprising a toroidal core and a conductive wire wound around the toroidal core, wherein the toroidal core comprises a magnetically permeable material wrapped around the insulating base layer. See *e.g.*, ¶¶ 0042 - 0048 and FIGS. 5 and 11.

## VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Whether Claims 10, 12-20, 22, 35, 37, and 39-41 are patentable over *Mumby* (U.S. 5,563,512) in view of Applicants' Admitted Prior Art (AAPA). These claims stand or fall together.

2. Whether Claim 11 is patentable over Mumby (U.S. 5,563,512) in view of Applicants' Admitted Prior Art (AAPA).

3. Whether Claim 21 is patentable over Mumby (U.S. 5,563,512) in view of Applicants' Admitted Prior Art (AAPA).

4. Whether Claim 36 is patentable over Mumby (U.S. 5,563,512) in view of Applicants' Admitted Prior Art (AAPA).

In the present case, the Examiner has rejected each of the claims on the grounds of obviousness under 35 U.S.C. §103. The 35 U.S.C. §103(a) rejections of all claims on appeal are traversed. Applicants submit that the Examiner has not properly established a *prima facie* case of obviousness for each of Claims 10, 12-22, 35, 36-37.

It is well established that to establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The rule is obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

Often, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue. To facilitate review, this analysis should be made explicit. *KSR International Co., v. Teleflex Inc.*, No. 04-1350, (US, April 30, 2007) (emphasis added).

## ARGUMENTS

### *A. 35 U.S.C. §103(a)* rejections of Claims *10, 12-20, 22, 35, 37 and 39-41* over *Mumby (U.S. 5,563,512) in view of Applicants' Admitted Prior Art (AAPA).*

The Examiner has rejected Claims 10, 12-20, 22, 35, 37, and 39-41 on the grounds of obviousness, under 35 U.S.C. §103(a), as being unpatentable over U.S. Patent No. 5,563,512 (Mumby), in view of Applicants' Admitted Prior Art ("AAPA"). In support of the rejection, the Examiner states the following on pages 3-5 of the July 25, 2007 Office Action:

As to claims 10 and 35,

Mumby discloses a propagation or induction resistivity antenna disposed on an elongated tubular having a longitudinal axis and adapted for subsurface disposal ((Title)) and (Figure 1) and (Column 5, Lines 54-58), a lateral resistivity sensor (100) disposed in a recess (60) in the elongated tubular ((Figures 2B and 7) and (Column 8, lines 47-62)), a shield (24) disposed on and above the tubular to cover the recess and the lateral resistivity sensor ((Column 6, Lines 2-5) and (Column 9, Lines 16-19) and (Figures 2B and 7)).

Mumby does not disclose an insulating mechanism including a circumferential gap, the circumferential gap extending continuously about the tubular to prevent electric current flow in the shield in a direction parallel to the longitudinal axis of the tubular near the lateral resistivity sensor.

AAPA discloses an insulating mechanism (36) including a circumferential gap, the circumferential gap extending continuously about the tubular to prevent electric current flow in the shield in a direction parallel to the longitudinal axis of the tubular near the lateral resistivity sensor (35) ((Figure 3B) and (Page 10, Paragraph [0017])) (note that only one end of the shield is in contact with the tubular).

> It would have been obvious to a person of ordinary skill in the art to modify Mumby to include an insulating mechanism including a circumferential gap, the circumferential gap extending continuously about the tubular to prevent electric current flow in the shield in a direction parallel to the longitudinal axis of the tubular near the lateral resistivity sensor as taught by AAPA in order to prevent the shield from short circuited the current so as to permit a transverse magnetic field to be induced in the formation (Page 10, Paragraph [0017], lines 5-8). (emphasis added).

Pages 3-5, Final Office Action mailed July 25, 2007.

The Examiner incorrectly concludes that Mumby's antenna coil 100 is a lateral resistivity sensor. As a result, the Examiner incorrectly cites Mumby as disclosing "a lateral resistivity sensor in a recess in an elongated tubular," as required by Claim 10. Furthermore, the Examiner fails to show the combination of "a propagation or induction resistivity antenna" and "a lateral resistivity sensor in a recess," both in the same elongated tubular, as also required by Claim 10.

The Examiner explains in his Advisory Action, that he "is broadly interpreting the phrase "lateral resistivity sensor" to include a sensor that detects formations that are located laterally to the borehole, and that can be used to find the resistivity of the formation." Continuation Sheet of Advisory Action mailed October 11, 2007. This interpretation is overly broad, and as will be further explained, ignores the "ordinary and customary" meaning of the term as used in Applicants' Claims and Specification. Applicants acknowledge that during examination, the claims must be interpreted as broadly as their terms reasonably allow. *In re American Academy of Science Tech Center*, 367 F.3d 1359, 1369, 70 USPQ2d 1827, 1834 (Fed. Cir. 2004). Applicants note, however, that "[t]his means that the words of the claim must be given their plain meaning unless the plain meaning is inconsistent with the specification." *In re Zletz*, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989); *Chef America, Inc. v. Lamb-Weston, Inc.*, 358 F.3d 1371, 1372, 69 USPQ2d 1857 (Fed. Cir. 2004). Moreover, "[t]he ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, *i.e.*, as of the effective filing date

of the patent application." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313, 75 USPQ2d 1321, 1326 (Fed. Cir. 2005) (*en banc*). *Sunrace Roots Enter. Co. v. SRAM Corp.*, 336 F.3d 1298, 1302, 67 USPQ2d 1438, 1441 (Fed. Cir. 2003); *Brookhill-Wilk 1, LLC v. Intuitive Surgical, Inc.*, 334 F.3d 1294, 1298 67 USPQ2d 1132, 1136 (Fed. Cir. 2003) ("In the absence of an express intent to impart a novel meaning to the claim terms, the words are presumed to take on the ordinary and customary meanings attributed to them by those of ordinary skill in the art."). It is the use of the words in the context of the written description and customarily by those skilled in the relevant art that accurately reflects both the "ordinary" and the "customary" meaning of the terms in the claims. *Ferguson Beauregard/Logic Controls v. Mega Systems*, 350 F.3d 1327, 1338, 69 USPQ2d 1001, 1009 (Fed. Cir. 2003).

In the present case, the phrase "lateral resistivity sensor" has a definite meaning to one skilled in the art and this meaning is clearly supported by Applicants' Specification. A lateral-type tool is one that uses electrodes to make its measurements. See US 2,842,735 Col. 4, ll. 43-69. It is so named because the electrode configuration provides a deeper depth of investigation (i.e., greater lateral extent) than a conventional normal-type tool. The '735 patent continues in the same sentence to describe an induction-type device as one that uses coils, not electrodes. Applicants have used the term "lateral resistivity sensor" to include electrodes and electrode-equivalent devices, but exclude sensors such as coils used on induction or propagation tools. Applicants, in their written description, differentiate lateral resistivity sensors from other sensors, including sensors that fall into the ambit of the Examiner's overly broad interpretation. To Applicants' detriment, the Examiner has failed to use the ordinary and customary meaning of the phrase as understood by one of ordinary skill in the art and as clearly delineated in Applicants' Specification.

First, the Examiner admits that Mumby discloses a propagation or induction resistivity antenna ("Mumby discloses a propagation or induction resistivity antenna disposed on an elongated tubular…"). Page 3, last paragraph, Final Office Action mailed July 25, 2007. The coil-type antenna 100 disclosed by Mumby may very well be a "sensor that detects formations that are located laterally to the borehole, and that can be used to find the resistivity of the formation." It does not equate, however, to a lateral resistivity sensor. As Applicants have

pointed out, lateral resistivity sensors are understood by those of ordinary skill in the art as sensors that can be approximated by electric dipoles. Page 5, Response to Final Office Action mailed July 25, 2007. Examples of lateral resistivity sensors include electrodes and toroidal antennas. Solenoidal, or coil/loop-type antennas such as those disclosed by Mumby and generally found on propagation or induction tools are approximated, on the other hand, by magnetic dipoles (not electric dipoles).

Applicants' Specification provides a clear and expansive discussion on the difference between lateral resistivity sensors as generally understood in the art, such as that of the present invention, and resistivity antennas for induction or propagation tools, as cited by the Examiner. This discussion makes clear that the present invention requires "a lateral resistivity sensor" when that term is used and not a propagation or induction resistivity antenna. In fact, the specification describes lateral resistivity sensors in contrast to and then, in combination with, the prior art solenoid or coil-type propagation or induction resistivity antennas that are disclosed in Mumby and cited by the Examiner. Further indication that the two have separate meanings is that Applicants' claimed invention recites both "a propagation or induction resistivity antenna" and "a lateral resistivity sensor disposed in a recess." See *e.g.*, Claim 10.

Applicants' Specification explains that there are generally two types of LWD tools for measuring formation resistivity: (i) lateral tools and (ii) induction or propagation tools. ¶ 0006. The specification teaches that propagation-type tools and induction-type tools use transmitters to generate magnetic fields that induce currents to flow in the formation, and that typical induction and propagation tools are not configured to resolve resistivity variations around the wellbore. Further, "[c]onventional induction or propagation tools use wound coils or solenoids as transmitter and receiver antennas. "The antennas are disposed on the instrument by winding a coil around the tool body..." ¶ 0007. This coil-wound structure is depicted in FIG. 2A of Applicants' Specification. As will be further discussed below, this coil-wound structure of a solenoidal antenna is also evident in FIGS. 6 and 7 of Mumby - which the Examiner cites for a lateral resistivity sensor.

The lateral tool, on the other hand, "typically uses one or more antennas or electrodes to inject low frequency transverse magnetic fields into the formation to determine borehole information responses by measuring the current flow through the formations to the receivers." ¶ 0008. Lateral resistivity tools are generally responsive to azimuthal variations and formation resistivities around the borehole. "To transmit a transverse magnetic field into a formation, a lateral tool typically uses a toroidal transmitter, which is built by wrapping a conductive wire around the donut-shape, magnetically permeable core (a toroidal core). To detect currents that flow in the formation, a lateral tool uses an electrode (*e.g.*, ring electrode or button electrode) receiver or toroidal receiver. In conventional LWD tools, the toroidal transmitters or receivers are typically built in a sleeve that is slipped onto the drill collar at the final stage of assembly." ¶ 0009. This toroidal structure of a lateral resistivity sensor is depicted, among other places, in FIG. 3B (Prior Art), and FIGS. 4, 5, and 9 of Applicants' Specification.

To elaborate, FIG. 2A of Applicants' Specification depicts, in cross-sectional view, a prior art propagation/induction resistivity antenna - a solenoidal antenna. The sensor in FIG. 2A may be compared with the cross-sectional view of FIG. 7 in Mumby, which shows the antenna 100 cited by the Examiner. Both Figures show a recess, a shield, and a sensor or antenna in cross-section. Both sensor 25 and antenna 100 reveal conductive wire or coil segments coming into or out of the page, *i.e.*, wrapped about the elongated tubular. See also FIG. 6 of Mumby. Both are solenoidal antennas. This is different from the lateral resistivity sensor 51 revealed in the cross-sectional view of Applicants' FIG. 5, where conductor wire 52 of the toroidal antenna 50 are shown wrapped about a toroidal core 51.

It should be noted that both Mumby and Applicants' invention are concerned with the overall construction of the tool, including the provision of a shield to protect the antenna or sensor. Applicants' Specification discusses later:

> The importance of a properly designed shield is well recognized in the art. For example, U.S. Patent No. 6,566,881 issued to Omeragic, et al. discloses various shields for EM logging tools, including those having transverse antennas.
>
> However, the design of a shield for a solenoidal antenna, which produces a magnetic dipole, is different from the design of shields for a toroidal antenna,

> which produces an electric dipole and operates at much lower frequencies. It is well known in the art that the efficient operation of an antenna and the design of its shield depend on the operating frequencies and the physical characteristics of the antenna. As noted above, an induction or propagation antenna is designed to produce a high frequency electric field into the formation, whereas a toroidal antenna is designed to produce a low frequency magnetic field into the formation. Therefore, conventional shields designed for propagation or induction antennas are generally not suitable for use with a toroidal antenna.
>
> Covering a toroidal antenna with a conventional antenna shield would short circuit the electric current induced by the toroidal antenna. Instead of flowing in the borehole and formation, the current would flow primarily in the shield. The formation signal would be reduced below the level suitable for the resistivity measurement.

Paragraph 51, Line 3 – Paragraph 53, Line 6.

As a final illustration of the distinction between lateral resistivity sensors and propagation or induction resistivity antennas, Applicants note that the title of the application is "A Combined Propagation and Lateral Resistivity Downhole Tool." Applicants also direct attention to Claim 10, which requires both (a) a propagation or induction resistivity antenna that is disposed on an elongated tubular and (b) a lateral resistivity sensor that is disposed in a recess in the elongated tubular. Applicants provide FIG. 11 which "shows a combined lateral sensor and a propagation sensor disposed on a tubular and protected by an integrated shield in accord with the invention" ¶ 0039. FIG. 11 provides "a lateral resistivity sensor 104 built into a first recess 53 … and a propagation resistivity sensor 105 built into a second recess 103 cut into the tubular wall." ¶ 0062, lines 2-4. Propagation resistivity sensor 105 in FIG. 11 is, in fact, of the same type of solenoidal or coil-loop antenna as disclosed in Mumby.

Based on the above discussion from Applicants' own Specification and Claims, it is clear that a lateral resistivity sensor is physically and functionally different from a propagation or induction resistivity antenna such as a solenoidal antenna. It follows also that it is clear that Applicants' use of the term "lateral resistivity sensor" excludes a solenoidal antenna and other coil-type antennas for induction or propagation tools. Nevertheless, the Examiner has ignored a

reading of Applicants' Specification and use of the subject terms, which are in accordance with the general understanding in the art, and used his own definition to cite a propagation or induction resistivity antenna (*i.e.*, a solenoidal antenna) in Mumby for a lateral resistivity sensor. This is improper.

Claims 10, 12-20, and 22

1a. As discussed above, the Examiner has failed to properly cite or establish a lateral resistivity sensor in a recess in an elongated tubular. The Examiner cites Mumby which is directed to induction or propagation type resistivity antennas, such as a solenoidal or coil-loop type antenna. Mumby fails to provide the requisite lateral resistivity sensor in a recess required by Claim 10. Accordingly, the Examiner has not shown, in the suggested combination of Mumby and AAPA, each and every element of Claim 10. With this failure, the Examiner has failed to establish a *prima facie* case of obviousness.

1b. Claim 10 also requires the combination of (a) a propagation or induction resistivity antenna disposed on an elongated tubular and (b) a lateral resistivity sensor disposed in a recess in the same elongated tubular. To clarify, Claim 10 requires both the propagation or induction resistivity antenna and the lateral resistivity sensor in a recess, to be on the same elongated tubular, *e.g.*, as shown in FIG. 11. According to Applicants' Specification, "lateral-type and propagation-type sensors are compatibly implemented within a tubular for subsurface use." Combined implementation of the lateral and the propagation sensors on the same tubular makes it possible to use an integrated sensor shield assembly on the tubular, if so desired. More importantly, the implementation of combined lateral and propagation sensors makes it possible to obtain multi-mode resistivity measurements from the same subsurface region in one pass, thus providing a more accurate and reliable subsurface resistivity determination." ¶ 0044, lines 8-19.

In citing Mumby, the Examiner has cited a propagation or induction resistivity antenna disposed in a recess in an elongated tubular. In citing AAPA, the Examiner again cites a propagation or induction resistivity antenna disposed in a recess in an elongated tubular. The Examiner has not cited a lateral resistivity sensor disposed in a recess in the same elongated tubular, nor the combination of propagation or induction resistivity antenna and lateral resistivity

sensor in or on the same elongate tubular. Accordingly, the Examiner has not shown each and every element of Claim 10. The Examiner has, for this reason as well, failed to establish a *prima facie* case of obviousness.

2. With respect to the first criterion for establishing *prima facie* case of obviousness, Appellant respectfully submits that the Examiner has failed to provide an adequate suggestion or motivation, either in the references themselves (Mumby or AAPA) or in the knowledge generally available to one of ordinary skill in the art, to combine reference teachings.

The Examiner's rejection as found in pages 3 through page 5, of the Final Office Action has failed to provided an explicit analysis with an apparent reason that would have prompted a person of ordinary skill in the relevant field to combine the prior art elements in the claimed manner, as required by the US supreme Court in the recent *KSR* decision cited above. Here, the Examiner refers to Applicants' depiction of a conventional lateral resistivity sensor 30 in FIG. 3B in Applicants' discussion of the Background of the Invention. The sensor 30 includes an antenna 35 "embedded in an insulating material 36 and protected by a metal shield 37." "The proposed toroidal antennas are constructed in metal cylinders that are slipped over and screwed onto a drill collar." ¶ 0017. The toroidal antenna and sensor are not disposed in a recess.

The Examiner states:

> It would have been obvious to a person of ordinary skill in the art to modify Mumby to include an insulating mechanism including a circumferential gap, the circumferential gap extending continuously about the tubular to prevent electric current flow in the shield in a direction parallel to the longitudinal axis of the tubular near the lateral resistivity sensor as taught by AAPA in order to prevent the shield from short circuiting the current so as to permit a transverse magnetic field to be induced in the formation (Page 10, Paragraph [0017], lines 5-8).

Appellant respectfully submits that the Examiner has failed to specify, with reasonable clarity, the source of any "suggestion or motivation," *i.e.*, whether such "suggestion or motivation" can be found in the references themselves or in the knowledge generally available in the art. In either case, the Examiner has failed to produce any evidence showing that such "suggestion or

motivation" was indeed in the art prior to the invention claimed in the instant application. The Examiner's "suggestion or motivation" is therefore inadequate as being evidentially unsupported.

It appears that the Examiner proposes that the motivation for combining the teachings of the references is to use the shield in AAPA to prevent electric current flow in the shield in a direction parallel to the longitudinal axis of the tubular near the "lateral resistivity sensor" of Mumby (as taught by AAPA) and in order to prevent the shield from short circuiting the current so as to permit a transverse magnetic field to be induced in the formation. This motivation does not exist in Mumby. As discussed above, Mumby does not provide a lateral resistivity sensor, and therefore, does not require prevention of electric current flow in the shield in a direction parallel to the longitudinal axis of the tubular near the lateral resistivity sensor… in order to prevent the shield from short circuiting the current so as to permit a transverse magnetic field to be induced in the formation.

Accordingly, the Examiner has failed to establish the requisite suggestion or motivation for a *prima facie* case of obviousness.

3. Still with respect to the first criterion, Appellant respectfully submits that Mumby teaches away from the Examiner's proposed combination with AAPA.

A combination of the constructions of Mumby with the construction taught by the AAPA cited by the Examiner does not appear to be advisable. The construction cited by the Examiner is best illustrated in FIG. 3B. It appears that Mumby would teach against the combination of the FIG. 3B construction with its recess and antenna arrangement. Essentially, the suggested combination would entail replacing Mumby's (preferably metal) sleeve 24 with the metal shield 37 and insulating material 36 in FIG. 3B. The integration of the metallic shield 37 with the propagation sensor of Mumby would not fulfill or satisfy all of the requirements which are asked of and adequately met by Mumby's sleeve 24 with its slots 121. The resulting construction would not be desirable in the context of Mumby's teaching.

In introducing its invention, Mumby provides that "[t]he invention relates to an apparatus for sealing and physically protecting the antenna arrays and associated circuitry contained in an induction logging tool from the extreme pressures and harsh conditions…" Col. 1, lines 13-17.

Mumby explains further that:

> [a]lthough MWD induction logging tools have gained great acceptance, the present tools suffer from a variety of shortcomings. First, the antenna coils are generally not well protected under present day designs. The insulation covering the recesses in which the coils are embedded is frequently torn or punctured by the borehole when subjected to hostile downhole environment associated with MWD applications. When insulation is damaged or destroyed by abrasion or otherwise, the antenna themselves may be destroyed.
>
> ....

Mumby, Col. 3, line 7.

> "Ideally, the electronics compartment and antenna recesses of the tool would all be sealed by a single, easily removable cover, so as to eliminate the need for separating the electronics compartments from the antenna recesses."

Mumby, Col. 4, lines 3-7.

Accordingly, Mumby provides, as the invention, a tubular metallic sleeve that is disposed over the body and completely seals the antenna coils from the fluid in the borehole. The device includes slotted regions that are disposed about each antenna coil so as to allow desired electromagnetic signals to pass through the sleeve. Now, the Examiner suggests replacing this tubular metallic sleeve, which is at the heart of the Mumby invention, with the metal shield 37 in FIG. 3B. As shown in FIG. 3B, the metal shield 37 does not completely seal around the sensor 35 (nor is the sensor 35 situated in a recess). Further, the metal shield 37 appears to be embedded in, or partially supported by, the insulating material 36 rather than being fully supported about the tool body. It is clear then that the replacement of the Mumby metal shield and recess with anything provided in FIG. 3B, would result in a less stable shield construction and reduced sealing capabilities. Such a structural modification clearly departs from the objective and the improvements associated with the Mumby invention. The proposed combination of references is, therefore, an improper basis for a §103(a) obviousness rejection.

Applicants submit, therefore, that the Mumby reference teaches away from the combinations of references and structural modification suggested by the Examiner.

Claims 35, 37 and 39-41

In respect to independent method Claim 35, the combination of references suggested by the Examiner fails to teach one or more of the steps recited in the claim. Among other steps, the combination of the cited references fails to teach or suggest the step of disposing a lateral resistivity sensor in a recess in the elongated tubular. Furthermore, the reference fails to teach or suggest the combination of disposing a lateral resistivity sensor in a recess in the tubular and disposing an induction or propagation resistivity antenna on the [same] tubular. The Examiner's proposed combination of teachings fails, therefore, to show at least one step of independent method Claim 35.

In addition, Appellants submit, as explained above, that the Examiner has failed to establish the requisite suggestion or motivation for a *prima facie* case of obviousness and that, in fact, Mumby teaches away from the proposed combination. Accordingly, the Examiner has not established a *prima facie* case of obviousness in respect to Claims 35, 37 and 39-41.

For the above reasons, Appellants submit that Claims 10-22, 35-37, and 39-41 are patentable under 35 U.S.C. §103(a) over the cited references. Appellant respectfully requests the Honorable Board to reverse the rejections.

***B. 35 U.S.C. §103(a) rejections of Claim 11 over Mumby (5,563,512) in view of Applicants' Admitted Prior Art (AAPA).***

Claim 11 depends from Claim 10, and further recites that the lateral resistivity sensor includes a toroid. The Examiner has rejected Claim 11 under 35 U.S.C. §103(a) as being unpatentable over Mumby (5,563,512) in view of Applicants' Admitted Prior Art (AAPA). The Examiner states the following as reason for the rejection:

> As to Claim 11,
>
> Mumby does not disclose the lateral resistivity sensor includes a toroid.

> AAPA discloses the lateral resistivity sensor includes a toroid ((FIG. 3B) and (Page 10, Paragraph [0017])).
>
> It would have been obvious to a person of ordinary skill in the art to modify Mumby to include the lateral resistivity sensor includes a toroid as taught by AAPA in order to advantageously utilize a readily available antenna configuration for lateral sensing.

Page 15, Final Office Action mailed July 25, 2007.

As discussed above, the Examiner has failed to properly cite a lateral resistivity sensor in a recess, much less a toroid in a recess. Here, the Examiner again refers to Applicants' own FIG. 3B, a depiction of a conventional lateral resistivity sensor. As adequately explained in Applicants' Specification, the sensor and arrangement of FIG. 3B does not include a recess nor a lateral resistivity sensor or toroid disposed in a recess. Accordingly, the combination of references suggested by the Examiner would again fail to establish each and every element of the subject claim. Moreover, the Examiner's suggested combination of the references fails to establish the combination of (a) a propagation or induction resistivity antenna on an elongated tubular and (b) a lateral resistivity sensor including a toroid in a recess in the same elongated tubular. In addition, as explained above in respect to independent Claim 10 (under Section A), the Examiner also fails to establish the requisite suggestion or motivation for a *prima facie* case of obviousness based on the combination of references, and that, in fact, Mumby teaches away from the proposed combination.

For any of the above reasons, the Examiner has failed to establish a *prima facie* case of obviousness in respect to Claim 11. Appellants submit that Claim 11 is, therefore, patentable under 35 U.S.C. §103(a) over the cited references. Appellants respectfully request the Honorable Board to reverse the outstanding rejection.

### *C. 35 U.S.C. §103(a) rejections of Claim 21 over Mumby (5,563,512) in view of Applicants' Admitted Prior Art (AAPA).*

Claim 21 depends from Claim 10, and further recites that the induction or propagation resistivity antenna and the lateral resistivity sensor are disposed in the same recess in the same

elongated tubular. The Examiner has rejected Claim 21 under 35 U.S.C. §103(a) as being unpatentable over Mumby (5,563,512) in view of Applicants' Admitted Prior Art (AAPA). The Examiner states the following as reason for the rejection of the claim:

> As to claim 21,
>
> Mumby discloses the recess contains both the induction or propagation resistivity antenna and the lateral resistivity sensor (Column 7, Lines 50-60).

Applicants make a specific reference to a paragraph in Mumby (Col. 7, Lines 50-60) which is reproduced below:

> In the preferred embodiment of the invention, mandrel body 28 includes six recesses 60 and six electronics compartments 70 as shown schematically in FIG. 3. This arrangement provides one recess 60 and one compartment 70 for each of the transmitters T1-T4 and receivers R1 and R2. Although electronics compartments 70 are shown diagrammatically in FIG. 3 as if they were all aligned and formed along the same arcuate segment of mandrel body 289, in the preferred embodiment, the six electronics compartments 70 are circumferentially spaced apart by approximately 60 degrees along the outer surface 31 of mandrel body 28.

The above paragraph only mentions the inclusion of six recesses. Nothing in this paragraph even suggests the combination of a lateral resistivity sensor and an induction or propagation resistivity antenna. Further, this paragraph does not come close to suggesting either of those component pairs being on the same elongated tubular or further, in the same recess. Accordingly, the Examiner has failed to show each and every element of Claim 21. In addition, as explained above in respect to Claim 10 (under Section A), the Examiner also fails to establish the requisite suggestion or motivation for a *prima facie* case of obviousness based on a combination of references and that, in fact, Mumby teaches away from the proposed combination.

For any of the above reasons, the Examiner has failed to establish a *prima facie* case of obviousness in respect to Claim 21. Appellants submit that Claim 21 is, therefore, patentable

under 35 U.S.C. §103(a) over the cited references. Appellants respectfully request the Honorable Board to reverse the outstanding rejection.

### *D. 35 U.S.C. §103(a) rejections of Claim 36 over Mumby (5,563,512) in view of Applicants' Admitted Prior Art (AAPA).*

Claim 36 depends from Claim 35. Claim 36 further recites, among other elements, "assembling a toroidal antenna comprising toroidal core and a conductive wire wound around the toroidal core, wherein the toroidal core comprises a magnetically permeable material wrapped around the insulating base layer." The Examiner has rejected Claim 36 under 35 U.S.C. §103(a) as being unpatentable over Mumby (5,563,512) in view of Applicants' Admitted Prior Art (AAPA). The Examiner states the following as reason for the rejection of the claim:

> As to claim 36,
>
> Mumby discloses disposing the lateral resistivity sensor includes disposing a base layer of an insulating material (98) in the recess in the tubular ((Figures 2B and 7) and (Column 8, Lines 47-62).
>
> Mumby does not disclose assembling a toroidal antenna including a toroidal core and a conductive wire wound around the toroidal core, wherein the toroidal core includes a magnetically permeable material wrapped around the insulating base layer.
>
> AAPA discloses assembling a toroidal antenna including a toroidal core and a conductive wire wound around the toroidal core, wherein the toroidal core includes a magnetically permeable material wrapped around the insulating base layer (36) ((Figure 3B) and (Page 9, Paragraph [0016]) and (Page 10, Paragraph [0017])).
>
> It would have been obvious to a person of ordinary skill in the art to modify Mumby to include assembling a toroidal antenna including a toroidal core and a conductive wire wound around the toroidal core, wherein the toroidal core includes a magnetically permeable material wrapped around the insulating base layer as taught by AAPA in order to advantageously utilize a readily

available antenna configuration for inducing a magnetic field in the formation (Page 9, Paragraph [0016], Lines 1-2).

Pages 10-11 of the July 25, 2007 Office Action.

As discussed above in respect to Claim 10, the Examiner incorrectly cites Mumby for disclosing a lateral resistivity sensor in a recess. Here, the Examiner again refers to Applicants' own FIG. 3B, a depiction of the conventional toroidal antenna, for guidance. As adequately explained in Applicants' Specification, the toroidal antenna of FIG. 3B is not disposed in a recess. Accordingly, the combination of references suggested by the Examiner would fail to establish the step of disposing a lateral resistivity sensor including a toroidal antenna in a recess in an elongated tubular. The Examiner fails, therefore, to establish each and every element of Claim 36. Moreover, the Examiner's suggested combination of the references fails to establish the combination of (a) disposing a propagation or induction resistivity antenna on an elongated tubular and (b) disposing a lateral resistivity sensor or toroidal antenna in a recess in the same elongated tubular. In addition, as explained above in respect to independent Claim 35, the Examiner fails to establish the requisite suggestion or motivation (to combine the Mumby and AAPA references) for a *prima facie* case of obviousness and that, in fact, Mumby teaches away from the proposed combination.

For any of the above reasons, the Examiner has failed to establish a *prima facie* case of obviousness in respect to Claim 36. Appellants submit that Claim 36 is, therefore, patentable under 35 U.S.C. §103(a) over the cited references. Appellants respectfully request the Honorable Board to reverse the outstanding rejection.

## CONCLUSION

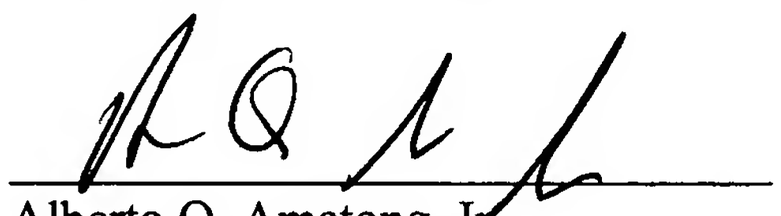
For at least the reasons set forth above, Appellants believe that the pending claims are in condition for allowance. Appellants respectfully requests that a reversal of all outstanding rejections and/or objections and early passage to issuance. Appellants believe that the present reply is fully responsive to all outstanding issues and places this application in condition for

allowance. If this belief is incorrect, or other issues arise, please do not hesitate to contact the undersigned at the telephone number listed below.

A Petition for a Three Month Extension of Time is attached hereto. If the appropriate Petition for an Extension of Time is not attached hereto (or any other Petition required of the application), this statement shall serve as Applicants' Petition to the U.S.P.T.O. The Commissioner is hereby authorized to charge any additional fees or credit any overpayments related to this Appeal Brief to Deposit Account No. **190610 (24.0808US)**, maintained by Schlumberger Technology Corporation.

The undersigned is available for consultation at any time, if the Examiner believes such consultation may expedite the resolution of any issues.

Respectfully submitted,



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## VIII. CLAIMS APPENDIX

10. A resistivity logging tool, comprising:

a propagation or induction resistivity antenna disposed on an elongated tubular having a longitudinal axis and adapted for subsurface disposal;

a lateral resistivity sensor disposed in a recess in the elongated tubular;

a shield disposed on and about the tubular to cover the recess and the lateral resistivity sensor; and

an insulating mechanism including a circumferential gap, the circumferential gap extending continuously about the tubular to prevent electric current flow in the shield in a direction parallel to the longitudinal axis of the tubular near the lateral resistivity sensor.

11. The resistivity logging tool of Claim 10, wherein the lateral resistivity sensor comprises a toroid.

12. The resistivity logging tool of Claim 10, further comprising an electrode disposed on the tubular, the electrode selected from one of a ring electrode, a button electrode, and a combination thereof.

13. The resistivity logging tool of Claim 10, wherein the lateral resistivity sensor comprises: an insulating base layer disposed in the recess in the tubular; and a toroidal antenna disposed over the insulating base layer.

14. The resistivity logging tool of Claim 13, wherein the toroidal antenna comprises a conductive wire disposed over the insulating layer.

15. The resistivity logging tool of Claim 13, wherein the toroidal antenna comprises a toroidal core formed from one of a magnetically permeable material wrapped in the tubular recess or a ferrite material disposed in the recess.

16. The resistivity logging tool of Claim 10, wherein the lateral resistivity sensor includes a pressure compensating mechanism.

17. The resistivity logging tool of Claim 10, wherein the circumferential gap is a continuously extending gap incorporated in the shield.

18. The resistivity logging tool of Claim 17, wherein the circumferential gap is filled with an insulating material.

19. The resistivity logging tool of Claim 10, wherein the circumferential gap includes an electrically insulating material disposed between a junction formed between the shield and the tubular.

20. The resistivity logging tool of Claim 10, wherein a section of the shield positioned over the induction or propagation resistivity antenna comprises at least one slot filled with an insulating material.

21. The resistivity logging tool of Claim 10, wherein said recess contains both the induction or propagation resistivity antenna and the lateral resistivity sensor.

22. The resistivity logging tool of Claim 10, wherein the tubular is a drill collar.

35. A method for building a resistivity tool using an elongated tubular having a longitudinal axis and adapted for disposal within a subsurface formation, comprising:

disposing a lateral resistivity sensor in a recess in the tubular;

disposing an induction or propagation resistivity antenna on the tubular;

positioning a shield assembly on and about the tubular to cover the recess and the lateral resistivity sensor; and

extending a circumferential gap continuously about the tubular and electrically between the shield assembly and the tubular, thereby preventing electric current to flow along the shield in a direction parallel to the longitudinal axis of the tubular near the lateral resistivity sensor.

36. The method of Claim 35, wherein disposing the lateral resistivity sensor comprises:

disposing a base layer of an insulating material in the recess in the tubular; and

assembling a toroidal antenna comprising a toroidal core and a conductive wire wound around the toroidal core, wherein the toroidal core comprises a magnetically permeable material wrapped around the insulating base layer.

37. The method of Claim 35, further comprising adapting the recess in the tubular with a pressure compensating mechanism.

39. The method of Claim 35, wherein the circumferential gap is incorporated in the shield assembly and is filled with an insulating material.

40. The method of Claim 35, further comprising disposing an electrically insulating material between a junction formed between the shield and the tubular.

41. The resistivity logging tool of Claim 10, wherein the circumferential gap is incorporated into the tubular and positioned between the shield and the tubular.

## IX. EVIDENCE APPENDIX

NONE

## X. RELATED PROCEEDINGS APPENDIX

NONE